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THE EFFECTS OF EDUCATION ON  
FEAR-AVOIDANCE BEHAVIOR OF  
SUBJECTS WITH WORK-RELATED  
LOW BACK PAIN

By

Marie A. Anger

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A Publishable Paper in Lieu of a Thesis in  
Partial Fulfillment of the Requirements for the  
Degree Doctor of Physical Therapy Science

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June 2001

Each person whose signature appears below certifies that this publishable paper, in his or her opinion, is adequate in scope and quality as a publishable paper in lieu of a thesis for the degree Doctor of Physical Therapy Science.



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## ABSTRACT

### THE EFFECTS OF EDUCATION ON FEAR-AVOIDANCE BEHAVIOR OF SUBJECTS WITH WORK-RELATED LOW BACK PAIN

by

Marie A. Anger

**Background and Purpose.** Fear-avoidance behavior contributes to chronic low back pain. The purpose of this study was to determine whether patient education on fear-avoidance behavior added to conventional physical therapy would have significant effects on return to work status in contrast to a comparison group with only physical therapy intervention. Return to work status was measured by the length of time from the initial injury to the subject's return to work on regular duty.

**Subjects.** Thirty-four workers' compensation subjects with low back pain who exhibited fear-avoidance behavior, according to their responses to the Fear-Avoidance Beliefs Questionnaire, were alternately assigned either to an educational group or a comparison group.

**Methods.** Both groups received conventional physical therapy. Subjects in the educational group were also given an educational booklet and received counseling on pain-coping mechanisms from the physical therapist.

**Results.** Although the difference in time of return to work on regular duty was not statistically significant ( $p=.06$ ), there was a noticeable difference between the two groups. By 45 days after the date of the initial injury, all of the subjects in the educational group had returned to work on regular duty, whereas one third of the subjects in the comparison group were still

either on modified duty or off work entirely. Three subjects in the comparison group had still not returned to regular duty 90 days after the date of the initial injury. **Conclusion and Discussion.** The results of this study suggest that the number of patients with chronic low back pain who remain off work 90 days after an initial injury, may be reduced by education on the benefits of staying active.

Key Words: Fear-Avoidance behavior, Low back pain, Patient education, Workers' Compensation.



Low back pain (LBP) is the most costly benign condition in industrialized countries. LBP claims represent the largest category of workers' compensation claims.<sup>1-4</sup> Half of the individuals who develop low back pain return to work within two weeks and 70 to 80 per cent recover within one month. The problem lies with the 20 to 30 per cent who remain disabled after three to four months. The chances of these individuals remaining disabled for one year or longer rise significantly. It is this group of chronic LBP sufferers that accounts for the majority of the total costs of workers' compensation LBP claims.<sup>5,6</sup> Seven per cent of the total cases of LBP account for 70 per cent of all compensation costs.<sup>7</sup>

In most of these cases, there is no objective evidence of a physical or organic cause for the chronic LBP. Nevertheless, many of these patients have less tissue pathology and report pain of greater intensity than those who return to work within the first month following injury.<sup>8-13</sup> This phenomenon calls for the early identification, in the primary or referral care setting, of persons at risk of developing chronic low back pain lasting longer than three months, and for appropriate forms of intervention.

In 1994, the Agency for Health Care Policy and Research (AHCPR) recommended, in Clinical Practice Guideline No. 14, that clinicians help patients with LBP improve activity tolerance to avoid chronicity.<sup>14</sup> Two studies performed in 1995 demonstrated that when injured workers were encouraged to resume normal activity, the rate of recovery was faster than when they were either on bed rest or with prescribed back exercises.<sup>15,16</sup> More recently, the 2000 *Report of the International Paris Task Force on Back Pain* stated that one priority for

research should be to “develop and evaluate strategies related to the prescription of activity to patients who have back pain and the evaluation of therapeutic results in these patients.”<sup>17</sup>

A broad array of psychosocial issues can interfere with the patient’s ability to tolerate activity. These are sometimes referred to as “yellow flags.”<sup>17-20</sup> Such issues may be emotional stresses, work dissatisfaction, fear-avoidance behavior, compensation issues, or even family problems. It is believed that isolating these important psychosocial issues in the early stages of LBP and addressing them in a timely and appropriate fashion may prevent the development of chronicity.<sup>17,18,20-23</sup>

Fear-avoidance behavior is due to fear and anxiety responses towards pain which contribute to self-limiting behavior and the avoidance of activity altogether. The results are

- a. inflated expectations of pain and a reduced range of motion during physical activity,
- b. greater depression and general disability, and
- c. decreased coping with pain.<sup>10,12,24-26</sup>

Fear-avoidance behavior is of particular concern to physical therapists because initial treatment of LBP usually consists of physical therapy and non-steroidal anti-inflammatory medication. The patient’s expectation of passive treatment rather than active participation in recovery can lead to low physical performance.<sup>20</sup> However, it is now widely accepted that, along with a medical model of intervention, a proactive biobehavioral management strategy is necessary to fully implement functional restoration.<sup>18,27-29</sup> The physical therapist should, therefore, understand the psychology of pain and be able to implement

treatment strategies that target maladaptive pain behaviors, such as fear-avoidance behavior.

Individual perception of LBP may be expressed as overt pain behavior, such as excessive moaning, sighing, rubbing or holding the affected body part. Negative beliefs regarding pain and the fear of reinjury cause many patients to be unable to distinguish between hurt with activity and harm with activity.

An injured worker's beliefs about his or her capabilities regarding particular physical activities can determine the extent to which he or she demonstrates tolerance to physical therapy or when he or she ultimately returns to work.<sup>24,27,30,31</sup> Burton et al<sup>32</sup> demonstrated that fear of pain was seven times more predictive of chronic LBP one year after onset than demographic variables such as age and gender, or clinical variables such as radiating symptoms and range of motion. A study conducted in Europe in 1997 reported that Dutch nurses with low back injuries had more healthy and positive attitudes and beliefs regarding pain, work, and activity, than those of Belgian nurses. Loss of work time was significantly less for Dutch nurses, although their workload was substantially greater than that of Belgian nurses.<sup>33</sup> Crombez et al<sup>34</sup> showed that poor performance in trunk flexion/extension and weight lifting was best predicted by fear of pain regardless of actual reported pain intensity during testing. A similar study by Al-Obaidi et al<sup>35</sup> showed that spinal isometric strength performance was adversely affected by anticipation of pain and fear-avoidance behavior, while actual pain experience during testing was not a significant factor. Because the fear of pain can limit physical performance and therefore increase loss of time from work, it is helpful to have a tool to identify patients who exhibit fear-avoidance behavior.

Many discriminative health status questionnaires exist and are used as screening tools to help shed light on the subjective experience of pain. They are not meant to be diagnostic, but rather, are adjuncts to personal interviews and clinical findings. The Fear-Avoidance Beliefs Questionnaire (FABQ), developed by Waddell et al<sup>31</sup> in 1993 for patients with LBP, is a 16-item measure of individual beliefs about whether physical activity and work should be avoided. The questionnaire takes about five minutes to complete and is compatible with a busy workers' compensation physical therapy practice. The FABQ score is divided into two subscale scores: one for physical activity in general and one for work. Items are answered on a Likert scale from "completely agree" to "completely disagree" and include statements such as

"Physical activity might harm my back" and

"My work makes, or would make my back worse."

Test-retest reproducibility over time is good for the individual items and subscale scores. The scores also show validity by correlating in a predictable manner with measures of disability.<sup>31</sup> This short questionnaire can be administered to physical therapy patients with LBP just prior to the initial evaluation and may be used to help identify a specific population to target with an appropriate intervention technique.

By the sheer nature of their profession, physical therapists encourage patients who fear pain and avoid activity to participate in a treatment plan that includes therapeutic exercises and a home exercise program. In today's busy practices, therapists cannot devote adequate time for counseling patients who demonstrate fear-avoidance behavior. Such patients often continue on a course of prolonged inactivity and failure to progress.

It is important that physical therapists develop time-efficient methods to educate patients who demonstrate fear-avoidance behavior. If such patients understand methods of pain control, and the benefits of activity, their fear of pain may lessen. An efficient method of education is through printed material. Hundreds of leaflets and booklets on back pain are available that primarily address the injured back in terms of the medical problem. Information and advice focus on the anatomy of the back, body mechanics, and conventional treatment options. Such booklets often give information on activity restriction or modification. Few of them have undergone scientific evaluation for their effectiveness.<sup>36,37</sup>

Two research studies have been conducted using educational booklets that emphasize the need for maintaining normal daily activity, and reducing pain-related stress and anxiety following back injury. They have shown positive results in terms of reduced time off work, fewer specialist referrals, and less fear-avoidance beliefs about pain.<sup>38,39</sup> A recent study in the United Kingdom used an educational booklet that encouraged the injured worker with LBP to be a “coper” with back pain during physical activity rather than an “avoider” of activity. Individuals who had high fear-avoidance beliefs on pre-test administration of the FABQ were issued the educational booklet. These individuals had improvement in fear-avoidance beliefs on post-testing after two weeks, although no change in pain-perception was noted. The authors advise healthcare providers to distribute educational materials with information and advice about the management of low back pain.<sup>40</sup>

A readily available booklet for healthcare providers in the United States, *Back Pain-How to Control a Nagging Backache*,<sup>41</sup> also addresses pain-coping

mechanisms and promotes return to normal activity. Dr. Arthur White was one of the consultants for the booklet which is a condensed version of other books he has published on management of LBP.<sup>42</sup> The key titles are

- \* Inactivity and stress can set the stage for back pain
- \* Do not allow back pain to control your life
- \* Understand the pain cycle
- \* Get pain under control as soon as possible
- \* You can control your pain with exercise and relaxation
- \* Stay as active as possible

The booklet is easy for the patient to read and can provide the physical therapist with a basis for discussion and education for those patients identified with fear-avoidance behavior. Patients with work-related LBP who avoid activity may benefit from this form of education in physical therapy. Through education they may develop less fear of physical activity and consequently experience a speedier return to regular duty.

The purpose of this study was to determine whether physical therapy intervention with written education and counseling on fear-avoidance behavior would have significant effects on return to work status in contrast to a comparison group who received only physical therapy intervention. Return to work status was measured by time lapsed between initial low back injury and return to work on regular duty within a cut off time of 90 days from the date of the initial injury. The population for this study was patients with LBP who were at risk of developing chronicity. They were identified during the physical therapy initial evaluation using the FABQ.

## **Method**

### *Subjects*

The sample consisted of 34 workers' compensation patients with low back pain who had been referred by a physician to receive physical therapy in a workers' compensation clinic. Subjects were eligible for this study if they

- (1) had been diagnosed with LBP of musculoskeletal origin;
- (2) could read English;
- (3) were between the ages of 18 and 65 years; and
- (4) had an FABQ score of 50 or higher.

Subjects were excluded from this study if they

- (1) were awaiting back surgery or had undergone back surgery within the last year;
- (2) had a diagnosis of herniated disc greater than 3 mm.;
- (3) had spondylolisthesis, spinal stenosis, ankylosing spondylitis, vertebral fractures, or neurological disease.

### *Procedure*

After the initial physical therapy evaluation, patients who satisfied the first three inclusion criteria and all exclusion criteria signed a consent form administered by the physical therapist. The FABQ was then administered. Consecutive patients who had an FABQ score of 50 or higher were alternately placed into an educational (E) group or a comparison (C) group. Both groups received conventional physical therapy treatment (modalities for pain control, therapeutic exercises, home program, education on back mechanics) for their symptoms of LBP. Subjects in the educational group were given copies of the educational booklet, *Back Pain-How to Control a Nagging Backache*, and were given the opportunity to read the booklet during the first physical therapy

session. They were told that the physical therapist would discuss the booklet with them at the end of the treatment session. The therapist used three structured questions to initiate discussion and thus reinforce the information in the booklet. The questions were

- (1) "Did you learn anything new from the booklet?"
- (2) "Are there any points that you found unclear in the booklet?"
- (3) "Do you think that this booklet has provided information that will help you cope with your back pain more easily?"

The therapist continued to provide reinforcement of the skilled educational intervention during the subsequent physical therapy sessions. During each physical therapy session, the therapist asked the subject whether he or she was trying to stay active and cope with his or her LBP. Based upon the individual subject's responses, the physical therapist discussed topics including

- (1) low back pain can be painful, but pain rarely means there has been serious damage to the back;
- (2) most low back pain quickly resolves;
- (3) the pain cycle repeats itself with inactivity and stress
- (4) worrying about back pain can cause stress-related muscle spasms;
- (5) the mind can control stress and pain through relaxation techniques, (e.g. visualization, positive self-talk, or muscle relaxation);
- (6) inactivity causes weak or stiff muscles that are more likely to be re-injured; and
- (7) activity benefits overall health and well-being.

The effectiveness of the physical therapy education using the educational booklet and counseling on fear-avoidance behavior was measured by return to regular duty within 90 days of the date of the initial low back injury, as



documented in the subject's workers' compensation claim. Data for return to work on regular duty for each subject was cut off at 90 days following the date of the initial injury. The proportion of subjects in (E) that returned to regular duty within the 90 days following the initial injury was compared to those in (C) using a z-test. In addition, the actual time lapsed from the date of the initial injury to return to regular duty (90 days for those who did not return to regular duty within this time period) was compared using a Mann-Whitney test.

## **Results**

Of the 57 eligible patients with a diagnosis of low back pain, 55 agreed to participate in this study. After signing the consent form and answering the FABQ, 36 subjects met all inclusion criteria. The 36 subjects were alternately divided into the two groups: Educational (E) (n=18; 15 males, 3 females) and Comparison (C) (n=18; 16 males, 2 females). Due to a later diagnosis of a herniated disc, two of the male subjects in (E) were dropped from the study after physical therapy was initiated.

Gender, overt pain behavior, and the presence of radiating symptoms were compared between groups using a Chi-square test for homogeneity. There were no significant differences in distribution between groups for these variables (Table 1). The groups also did not differ in age or FABQ scores (Table 2). The pain level at the physical therapy initial evaluation was not significantly different between groups, as evaluated using a Mann-Whitney test (Table 2).

Time lapse from the date of the initial injury to the subject's return to work on regular duty was not significantly different between groups, as shown using a Mann-Whitney test ( $p=.06$ ) (Table 3).

In (E), 64% of the subjects had returned to work within 30 days of initial injury while 56% of (C) remained either on modified duty or off work entirely. Three subjects in (C) had not returned to work on regular duty 90 days after the date of initial injury (Figure 1). The mean for each group is marked by the square symbol in the box. The symbols below and above the box mark the minimum and maximum values. The bottom, middle and top horizontal lines of the box mark the 25<sup>th</sup>, 50<sup>th</sup> and 75<sup>th</sup> percentiles respectively (Figure 1).

**Table 1.** Comparison of Gender and Pain Variables by Study Group

Variable	Educational (n=16) %	Comparison (n=18) %	p-value*
Gender			0.53
male	81.3	88.9	
female	18.8	11.1	
Overt pain behavior			0.19
yes	6.3	22.2	
no	93.8	77.8	
Radiating symptoms			0.75
yes	50	55.6	
no	50	44.4	

\* Chi-square tests

**Table 2.** Comparison of Age, Pain Level, and FABQ<sup>a</sup> Score by Study Group

Variable	Educational (n=16)	Comparison (n=18)	p-value
Age (yrs)			.33*
mean	35.8	32.7	
SD	9.0	9.1	
min/max	19/48	20/51	
Pain level (0-10)			.40**
mean	5.6	5.9	
median	5.5	6.0	
min/max	3/8	1/9	
FABQ score			.32*
mean	70.4	66.9	
SD	9.4	10.6	
min/max	52/84	52/88	

<sup>a</sup>FABQ=Fear-Avoidance Beliefs Questionnaire

\* Independent t-tests

\*\* Mann-Whitney test

**Table 3.** Comparison of Return to Work on Regular Duty by Study Group

Variable	Educational (n=16)	Comparison (n=18)	p-value <sup>*</sup>
Initial injury-RTW <sup>a</sup>			.06
median	18.5	27.0	
min/max	6/44	13/90	
mean**	22.8	41.6	

<sup>a</sup>RTW=return to work

\*Mann-Whitney tests

\*\* data collection terminated at 90 days

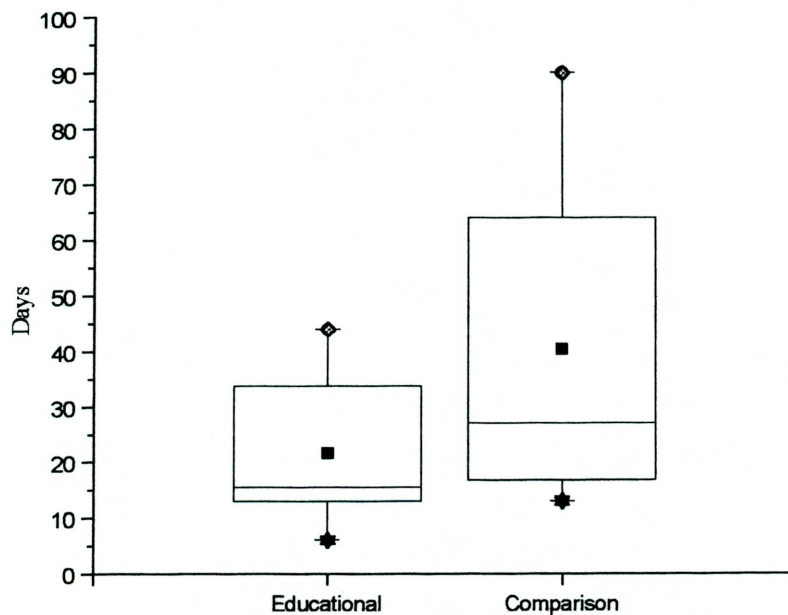


Figure 1. Comparison of days from the initial injury to return to work on regular duty by group.

## Discussion

Fifty-five subjects diagnosed with low back pain were eligible to participate in this study. During the first two weeks of the study, only two subjects, out of eleven who had consented to participate, scored high enough on the FABQ to be included in the study. Several of the subjects who did not qualify presented with overt pain behaviors, such as exaggerated gait patterns and excessive guarding with movement transitions, yet they did not seem to have fear-avoidance beliefs, according to their scores on the FABQ. In the third week, a subject who had consented to participate in the study asked if his FABQ answers were going

to be relayed to his employer. Even though it was clearly stated in the consent form that all information in the study would remain confidential, it seemed apparent at this point that the subjects needed to be verbally reassured that their employer, doctor, and insurance carrier would not be informed of their answers on the FABQ. It is possible that some subjects may have feared losing their jobs if their answers on the FABQ were interpreted as an unwillingness to work. By eliminating the fear of repercussion from the employer or insurance carrier, the ensuing subjects for this study scored noticeably higher on the FABQ. During the period of time in which subjects were recruited, 32 subjects scored high enough on the FABQ to be included in the study, compared to 12 who did not.

Although the time lapsed between initial injury and return to work on regular duty was not significantly different between groups, there was a noticeable difference between the two groups. The groups had similar distributions for all demographic variables and FABQ scores at the time of the physical therapy evaluation. The subjects in (C) took longer overall to return to work on regular duty than the subjects in (E) (Figure 1). The three subjects in (C) who had still not returned to work on regular duty 90 days after the date of initial injury accounted for 17% of the subjects in (C) which is similar to the 20%-30% of total patients in the United States who have LBP and have not returned to work on regular duty within three months after the date of injury.<sup>5,6</sup> It is this small cluster of patients that is of concern in regards to overall workers' compensation costs. None of the subjects in (E) fell into this category.

The research design for this study did not include data collection on the variables of attitudes towards stress, activity, exercise, and relaxation. The

following observations were made by the physical therapist during the course of the study. When discussing back pain with the subjects in (E), most of them stated that they did feel stressed and that they did not realize that stress might contribute to muscle tightness and therefore increased LBP. All of the subjects in (E) had indicated on the FABQ that they were afraid that activity would make their back pain worse. After reading the educational booklet and discussing the information with the physical therapist, all subjects in (E) agreed that normal daily activity was not harmful to their backs. After one or two sessions of discussing the benefits of activity with the physical therapist, most of the subjects in (E) came to their sessions announcing their improvement and relating the activities that they had been able to perform. In contrast, most of the subjects in (C) continued to come to physical therapy reporting the amount of back pain they were having and the particular activities that were aggravating it. This difference in behavior between groups seemed to confirm the fear-avoidance theory of pain behavior.<sup>10,12,13,24-26,29</sup> As with the subjects in (E), the subjects in (C) expressed, through the FABQ, their fear of activity causing increased LBP. However, this fear was not directly addressed using the educational intervention that subjects in (E) received. The subjects in (C) were initially encouraged, as with all patients participating in physical therapy, to participate in gentle therapeutic exercises and the benefits of these were explained. Most of the subjects in (C) voiced a fear that the therapeutic exercises might make their backs worse. The subjects in (E) had already had some educational intervention before they were started on therapeutic exercises and they did not voice as many fears of exercise as subjects in (C). The only difference in intervention was the additional education and counseling on pain control and fear-avoidance beliefs that the subjects in (E) received.

One of the patients who had been in (C) was prescribed physical therapy again as he had experienced another episode of LBP a few weeks after he returned to work on regular duty. Although he was not included in the study a second time, he was given the educational intervention and after two sessions his attitude had changed from depressed to optimistic. He reported that he was able to control his back pain and was determined not to let it get him down again. A future study might evaluate whether patients with fear-avoidance behavior who are given the educational intervention during physical therapy, experience significant changes in attitudes towards pain and activity.

Most of the subjects in (E) stated that they did not use any of the relaxation techniques described in the educational booklet to cope with their LBP. They stated that once they understood that LBP while engaged in physical activity did not necessarily mean that they were harming their backs, they just made a conscious decision not to worry about or dwell on the pain. Having done so, they noticed less pain and consequently they were able to become more active. In essence, once their beliefs changed, their actions did too. Again, this study did not include data collection on the use of relaxation techniques as these attitudes became noticeable only as the study progressed. Future research might examine whether coping with pain is achieved best through relaxation techniques or consciously ignoring pain.

One of the limitations of this study was the small sample size (N=34). The difference between groups on the variable of time between initial injury and return to work on regular duty was not significant ( $p=.06$ ). Significance may have been achieved had the sample size been larger. The study also would have been more generalizable if the educational intervention had been tested in more than one clinic.

## Conclusion

Both the Agency for Health Care Policy and Research<sup>14</sup> and the International Task Force on Back Pain<sup>17</sup> advise clinicians, including physical therapists, to develop and evaluate techniques that can help improve activity tolerance for patients with LBP who exhibit fear-avoidance behavior. This study showed that it is possible for physical therapists to identify and educate patients with fear-avoidance behavior and reduce the risk of patients with LBP developing chronicity.

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APPENDIX A

### Fear-Avoidance Beliefs Questionnaire (FABQ)

Here are some of the things which other patients have told us about their pain. For each statement please circle any number from 0 to 6 to say how much physical activities such as bending, lifting, walking or driving affect or would affect *your* back pain.

	Completely disagree		Unsure			Completely agree	
	0	1	2	3	4	5	6
1. My pain was caused by physical activity.....	0	1	2	3	4	5	6
2. Physical activity makes my pain worse.....	0	1	2	3	4	5	6
3. Physical activity might harm my back.....	0	1	2	3	4	5	6
4. I should not do physical activities which (might) make my pain worse.....	0	1	2	3	4	5	6
5. I cannot do physical activities which (might) make my pain worse.....	0	1	2	3	4	5	6

The following statements are about how your normal work affects or would affect your back pain.

	Completely disagree		Unsure			Completely agree	
	0	1	2	3	4	5	6
6. My pain was caused by my work or by an accident at work.....	0	1	2	3	4	5	6
7. My work aggravated my pain.....	0	1	2	3	4	5	6
8. I have a claim for compensation for my pain.....	0	1	2	3	4	5	6
9. My work is too heavy for me.....	0	1	2	3	4	5	6
10. My work makes or would make my pain worse.....	0	1	2	3	4	5	6
11. My work might harm my back.....	0	1	2	3	4	5	6
12. I should not do my normal work with my present pain...	0	1	2	3	4	5	6
13. I cannot do my normal work with my present pain.....	0	1	2	3	4	5	6
14. I cannot do my normal work till my pain is treated.....	0	1	2	3	4	5	6
15. I do not think that I will be back to my normal work within 3 months.....	0	1	2	3	4	5	6
16. I do not think that I will ever be able to go back to that work.....	0	1	2	3	4	5	6

**APPENDIX B**

The Effects of Education on Fear-Avoidance Behavior  
of Subjects With Work-Related Low Back Pain

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Data Collection Form

Date:

Subject number:

Group:                    \_\_\_ booklet                    \_\_\_ comparison

Diagnosis:

Gender:                    \_\_\_ male                    \_\_\_ female

Subject age in years at last birthday:

Occupation:

FABQ score:

Radiating symptoms to lower extremities:    \_\_\_ L    \_\_\_ R    \_\_\_ B    \_\_\_ none

Overt pain behavior:            \_\_\_ yes                    \_\_\_ no

Pain level on scale of 0 - 10 at initial evaluation:                    \_\_\_/10

Date of injury:

Date of return to regular duty at work:

Number of P.T. treatments:            \_\_\_ kept                    \_\_\_ missed

Researcher collecting data: